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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/756,771

01/14/2004

Kunikazu Kuchino

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BACON & THOMAS, PLLC

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EXAMINER

KITOV, ZEEV V

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/756,771	Applicant(s) KUCHINO ET AL.	
	Examiner ZEEV KITOV	Art Unit 2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 3, 11, 14 - 20, 23 - 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 3, 11, 14 - 20, 23 - 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/20/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Examiner acknowledges a submission of the amendment and arguments filed on July 20, 2009. Claims 1 and 15 are amended. A new Office Action follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 11, 14 – 18, 23, and 25 - 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuji (US 6,159,421) in view of Hirano (US 6,774,561).

Regarding Claim 1, Fuji discloses following: a photoelectron generating plate comprising a photoelectron emission layer (45 in Fig. 23) on a substrate (43 in Fig. 23) for emitting photoelectrons by an illumination of a light by a lamp (1 in Fig. 4) and inherently having a barrier property. It is well known in the art and supported by the evidence from on-line Encyclopedia Answers.com as follows: "When a metallic surface is exposed to electromagnetic radiation above a threshold frequency (which is specific to the surface of the material), the photons are absorbed and current is produced. No electrons are emitted for radiation with a frequency below that of the threshold because the electrons are unable to gain sufficient energy to overcome the electrostatic barrier presented by the termination of the crystalline surface (the material's work function). By

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the law of conservation of energy, the electron absorbs the energy of the photon and if sufficient, the electron can escape the material with a finite kinetic energy”.

Fuji further discloses the photoelectron emission layer being made of a ceramic material such as titanium carbide (col. 19, lines 1 – 21).

However, Fuji does not disclose a thickness of the photoelectron layer being greater than a maximum surface roughness of the underlying layer. Hirano discloses a light emitting device having a light emitting layer (6c in Fig. 1D) having a thickness of 50 nm and positioned on the top of a hole transporting layer (6b in Fig. 1C) having a thickness of 20 nm. It is clear therefore, that since the light emitting layer has a thickness of about two and half times larger than the underlying layer, the light emitting layer itself is thicker than the maximum surface roughness or unevenness of the underlying layer. It would have been obvious to one of ordinary skill in the art at the time the invention was made to set a thickness of the photoelectron emitting layer larger than the roughness of the underlying layer since, otherwise the photoelectron emitting layer would have too rough, uneven and not contiguous surface which would eventually substantially reduce its ability to efficiently emit the photoelectrons.

Regarding Claim 11, Fuji discloses the device having the photoelectron generating plate (45 in Fig. 23) and a light source for emitting the light (1 in Fig. 23).

Regarding Claims 16 - 18, Fuji et al. discloses the photoelectron emitter layer, i.e. the barrier layer made of carbide of Ti (col. 19, lines 1- 21), which as well known in the art, is a conductive material.

Regarding Claim 23, Fuji discloses a light source (1 in Fig. 23) for illuminating a light on the photoelectron emission layer (45 in Fig. 23) of the photoelectron generating plate.

Regarding Claims 14 and 24, Fuji discloses the cleaning system wherein the air flow (6 – 2 in Fig. 23 and Fig. 30), while as well known in the art, the air has a substantial content of the oxygen.

Regarding Claim 25, Fuji discloses a mesh-shaped photoelectron generating member. According to Fuji (col. 20, lines 13 – 39), the photoelectron emitter may be provided in various forms including a metal mesh. It further discloses the electron emitter (45 in Fig. 23) and electrode (51 in Fig. 23) having opposite electrical potentials. It further discloses the photoelectron generating member (photoelectron emitter) being installed in the vessel so that the air flowing in the vessel impinges onto the photoelectron generating member (shown in Fig. 14). According to Fuji (col. 20, lines 40 - 47), the strength of electric field may be up to 2kV/cm, and therefore, substantially high voltages are applied to the electrodes. Elementary rules of electrical safety require grounding one of the electrodes. Kim et al. disclose grounding a positive electrode (40 in Fig. 1) and alternatively grounding the negatively charged photoelectron emitter (20 in Fig. 2) through a wire (25 in Fig. 2, col. 4, lines 29 - 30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the Fuji system by grounding one of the electrodes, particularly the photoelectron emitter because such grounding is necessary to ensure electrical safety of the device since it uses substantially high voltages.

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All other elements of the claim are disclosed above (see Claim 1 rejection above).

Regarding Claim 26, Fuji discloses the light source generating an ultraviolet light (1 in Fig. 25).

Regarding Claim 27, Fuji discloses a structure including an ultraviolet lamp (1 in Fig. 25) surrounded by a mesh electrode (51 in Fig. 25) which is read on a mesh-shaped conductive member, which, in turn, is surrounded by a ceramic member 47 in Fig. 25) having a photocatalyst (in Fig. 25) 2 and a photoelectron emitter (45 in Fig. 25) attached thereto.

Regarding Claim 28, Fuji discloses the ventilator (Fan) (34 in Fig. 14) providing the air flow to the photoelectron generating device (6 – 2 in Fig. 23 and Fig. 30) by using a fan, and the photoelectron generating member (45 in Fig. 23 – 26), according to Fuji, may have as a preferred shape a mesh (col. 20, lines 13 – 39).

Claims 2, 3, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuji in view of Aprile et al. (US 5,418,424). Regarding Claims 2, and 3 Aprile et al. disclose the photoelectron emitting layer (12 in Fig. 1) being deposited on the top of the stainless steel substrate, which is a conductive substrate (col. 2, lines 45 – 56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Fuji structure by using the stainless steel as a substrate a material, because such selection makes possible using the substrate as one

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of the electrodes for providing an acceleration for the photoelectrons and directing their movement, i.e. drifting (col. 2, lines 5 – 24).

Response to Arguments

Applicant's arguments have been considered but are mostly moot in view of the new ground(s) of rejection. However, some of them are to be addressed.

Applicant's top labels on the Arguments and the Amended Claims text wrongly identify the case as 10/872,422. However, since the Arguments and the Amended Claims fit the instant case it was assumed that despite wrong label they belong to the instant case and were treated accordingly.

Applicant criticizes the Fiji and Hirano reference for allegedly not disclosing "a photoelectron generating plate in which the photoelectron generating layer or the photoelectron generating member generates negative particles or photoelectons by the illumination of the light" (page 2). However, (1) as shown in the Office Action, Fuji does disclose the photoelectron generating member issuing the photoelectrons (see Claim 1 rejection). To support his allegation the Applicant presents his interpretation of the references taken altogether generalizing them all as follows: "In other words, the materials disclosed in the prior art, like any "catalyst," merely enhance reactions and do not actually react to generate the negative particles or photoelectrons. The term "photocatalytic" refers to the fact that the catalytic processes are activated by light, and not to generation of negative particles in response to the light. Thus, Ogawa, Watanabe

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and Greenberg merely disclose the use of photocatalytic materials and do not disclose the photoelectron generating layer or the photoelectron generating member". The Applicant demonstrates a pretty strange logic alleging by implication that mere presence of the photocatalytic member somehow excludes a possibility of the photoelectron emission.

Fuji indeed discloses a photocatalytic member but at the same time, as shown in the current Office Action (see Claim 1 rejection), but it also discloses the photoelectron emission element (45 in Fig. 23).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose current telephone number is (571) 272 - 2052. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Jared Fureman can be reached on (571)-272-2391. The fax phone number for organization where this application or proceedings is assigned is (571) 273-8300 for all communications.

/Z. K./

Examiner, Art Unit 2836

12/1/2009

/Stephen W Jackson/

Primary Examiner, Art Unit 2836

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